

## WHAT IS CLAIMED IS:

1. A fabricated vehicle wheel comprising:  
a wheel rim; and  
5 a wheel disc secured to said wheel rim, said wheel disc defining an axis including a wheel mounting surface, a plurality of outwardly extending spokes, an outer rim connecting flange defining a side edge surface, and a window formed therein between adjacent pairs of said spokes and having a predetermined shape defined by said adjacent pairs of said spokes and said side edge surface of  
10 said rim connecting flange such that each of said windows extends to an outermost periphery of said wheel disc;  
wherein at least one of said windows includes at least a first window portion and a second window portion, said first window portion being formed by a first piercing operation and said second window portion being formed by a  
15 second piercing operation.
2. The fabricated vehicle wheel according to Claim 1 wherein said first window portion is formed by piercing through a first plane of said wheel disc and said second window portion is formed by piercing through a second  
20 plane of said wheel disc.
3. The fabricated vehicle wheel according to Claim 2 wherein said first plane is generally parallel with respect to said wheel disc axis and said second plane is at an angle with respect to said wheel disc axis.  
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4. The fabricated vehicle wheel according to Claim 1 wherein said at least one of said windows includes a first window portion, a second window portion, and a pair of third window portions, said first window portion being

formed by a first piercing operation, said second window portion being formed by a second piercing operation, and said third window portions being formed by a third piercing operation.

5           5.       The fabricated vehicle wheel according to Claim 4 wherein said first window portion is formed by piercing through a first plane of said wheel disc, said second window portion is formed by piercing through a second plane of said wheel disc, and said third window portions are formed by piercing through a third plane of said wheel disc.

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6.       The fabricated vehicle wheel according to Claim 5 wherein said first plane is generally parallel with respect to said wheel disc axis, said second plane is at an angle with respect to said wheel disc axis, and said third plane is at an angle with respect to said wheel disc axis.

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7.       The fabricated vehicle wheel according to Claim 6 wherein said spoke has a generally double-Z-shaped cross-section and includes a back wall, a pair of opposed side walls, and an pair of front walls, said back wall and said front walls extending generally parallel to one another, said third plane being  
20 generally parallel with respect to an axis defined by said side wall of said spoke.

8.       The fabricated vehicle wheel according to Claim 1 wherein said at least one of said windows includes two clearance zones.

25           9.       The fabricated vehicle wheel according to Claim 1 wherein said wheel disc is formed as an integral, one piece stamping formed from steel.

10. A fabricated wheel disc comprising:

a wheel disc including a wheel mounting surface, a plurality of outwardly extending spokes, an outer rim connecting flange defining a side edge surface, and a window formed therein between adjacent pairs of said spokes and having a predetermined shape defined by said adjacent pairs of said spokes and said side  
5 edge surface of said rim connecting flange such that each of said windows extends to an outermost periphery of said wheel disc;

wherein at least one of said windows includes at least a first window portion and a second window portion, said first window portion being formed by  
10 a first piercing operation and said second window portion being formed by a second piercing operation.

11. The fabricated wheel disc according to Claim 10 wherein said first window portion is formed by piercing through a first plane of said wheel disc  
15 and said second window portion is formed by piercing through a second plane of said wheel disc.

12. The fabricated wheel disc according to Claim 11 wherein said first plane is generally parallel with respect to said wheel disc axis and said second  
20 plane is at an angle with respect to said wheel disc axis.

13. The fabricated wheel disc according to Claim 10 wherein said at least one of said windows includes a first window portion, a second window portion, and a pair of third window portions, said first window portion being  
25 formed by a first piercing operation, said second window portion being formed by a second piercing operation, and said third window portions being formed by a third piercing operation.

14. The fabricated wheel disc according to Claim 13 wherein said first window portion is formed by piercing through a first plane of said wheel disc, said second window portion is formed by piercing through a second plane of said wheel disc, and said third window portions are formed by piercing through a  
5 third plane of said wheel disc.

15. The fabricated wheel disc according to Claim 14 wherein said first plane is generally parallel with respect to said wheel disc axis, said second plane is at an angle with respect to said wheel disc axis, and said third plane is at an  
10 angle with respect to said wheel disc axis.

16. The fabricated wheel disc according to Claim 15 wherein said spoke has a generally double-Z-shaped cross-section and includes a back wall, a pair of opposed side walls, and an pair of front walls, said back wall and said  
15 front walls extending generally parallel to one another, said third plane being generally parallel with respect to an axis defined by said side wall of said spoke.

17. The fabricated wheel disc according to Claim 10 wherein said at least one of said windows includes two clearance zones.  
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18. The fabricated wheel disc according to Claim 10 wherein said wheel disc is formed as an integral, one piece stamping formed from steel.

19. A method for producing a fabricated vehicle wheel comprising the steps of:

- (a) providing a wheel rim;
- (b) providing a wheel disc defining an axis and having a wheel mounting surface, a plurality of outwardly extending spokes and an outer rim connecting flange defining a side edge surface;
- (c) subjecting the wheel disc to at least a first window piercing operation to produce a first window portion in the wheel disc between a pair of adjacent spokes;
- 10 (d) subjecting the wheel disc to at least a second window piercing operation to produce a second window portion in the wheel disc, the first window portion and the second window portion cooperating to define a pierced window in the wheel disc having a predetermined shape defined by the adjacent pairs of spokes and the side edge surface of the rim connecting flange such that  
15 each of the pierced windows extends to an outermost periphery of the wheel disc; and
- (e) securing the wheel disc and the wheel rim together to produce the fabricated vehicle wheel.

20 20. The method for producing the fabricated vehicle wheel according to Claim 19 wherein the first window portion is formed by piercing through a first plane of the wheel disc and the second window portion is formed by piercing through a second plane of the wheel disc.

25 21. The method for producing the fabricated vehicle wheel according to Claim 20 wherein the first plane is generally parallel with respect to the wheel disc axis and the second plane is at an angle with respect to the wheel disc axis.

22. The method for producing the fabricated vehicle wheel according to Claim 19 wherein further including the step of subjecting the wheel disc to a third window piercing operation to produce a pair of third window portions in the wheel disc, the first window portion, the second window portion and the third  
5 window portions cooperating to define pierced windows in the wheel disc having a predetermined shape defined by the adjacent pairs of spokes and the side edge surface of the rim connecting flange such that each of the pierced windows extends to an outermost periphery of the wheel disc.

10 23. The method for producing the fabricated wheel disc according to Claim 22 wherein the first window portion is formed by piercing through a first plane of the wheel disc, the second window portion is formed by piercing through a second plane of the wheel disc, and the third window portions are formed by piercing through a third plane of the wheel disc.

15 24. The method for producing the fabricated vehicle wheel according to Claim 23 wherein the first plane is generally parallel with respect to the wheel disc axis, the second plane is at an angle with respect to the wheel disc axis, and the third plane is at an angle with respect to the wheel disc axis.

20 25. The method for producing the fabricated vehicle wheel according to Claim 24 wherein said spoke has a generally double-Z-shaped cross-section and includes a back wall, a pair of opposed side walls, and an pair of front walls, the back wall and the front walls extending generally parallel to one another, the  
25 third plane being generally parallel with respect to an axis defined by the side wall of the spoke.

26. The method for producing the fabricated vehicle wheel according to Claim 19 wherein the pierced window includes at least two clearance zones.

5 27. A method for producing a fabricated wheel disc comprising the steps of:

- (a) providing a wheel disc defining an axis and having a wheel mounting surface, a plurality of outwardly extending spokes and an outer rim connecting flange defining a side edge surface;
- 10 (b) subjecting the wheel disc to at least a first window piercing operation to produce a first window portion in the wheel disc between a pair of adjacent spokes; and
- (c) subjecting the wheel disc to at least a second window piercing operation to produce a second window portion in the wheel disc, the first window portion and the second window portion cooperating to define a pierce  
15 window in the wheel disc having a predetermined shape defined by the adjacent pairs of spokes and the side edge surface of the rim connecting flange such that each of the pierced windows extends to an outermost periphery of the wheel disc.

28. The method for producing the fabricated wheel disc according to  
20 Claim 27 wherein the first window portion is formed by piercing through a first plane of the wheel disc and the second window portion is formed by piercing through a second plane of the wheel disc.

29. The method for producing the fabricated wheel disc according to  
25 Claim 28 wherein the first plane is generally parallel with respect to the wheel disc axis and the second plane is at an angle with respect to the wheel disc axis.

30. The method for producing the fabricated wheel disc according to Claim 27 wherein further including the step of subjecting the wheel disc to a third window piercing operation to produce a pair of third window portions in the wheel disc, the first window portion, the second window portion and the third  
5 window portions cooperating to define pierced windows in the wheel disc having a predetermined shape defined by the adjacent pairs of spokes and the side edge surface of the rim connecting flange such that each of the pierced windows extends to an outermost periphery of the wheel disc.

10 31. The method for producing the fabricated wheel disc according to Claim 30 wherein the first window portion is formed by piercing through a first plane of the wheel disc, the second window portion is formed by piercing through a second plane of the wheel disc, and the third window portions are formed by piercing through a third plane of the wheel disc.

15 32. The method for producing the fabricated wheel disc according to Claim 31 wherein the first plane is generally parallel with respect to the wheel disc axis, the second plane is at an angle with respect to the wheel disc axis, and the third plane is at an angle with respect to the wheel disc axis.

20 33. The method for producing the fabricated wheel disc according to Claim 32 wherein said spoke has a generally double-Z-shaped cross-section and includes a back wall, a pair of opposed side walls, and an pair of front walls, the back wall and the front walls extending generally parallel to one another, the  
25 third plane being generally parallel with respect to an axis defined by the side wall of the spoke.



34. The method for producing the fabricated wheel disc according to Claim 27 wherein the pierced window includes at least two clearance zones.